

Synchrotron fights crime

By Lana Haight
of The StarPhoenix

Move over CSI — Saskatoon's CLS has the newest and brightest tool for fighting crime.

The Canadian Light Source (CLS) synchrotron, with its giant microscope that is illuminated by beamlines millions of times brighter than the sun, allows scientists to examine matter at a finer level of detail than ever before possible in Canada. It's the finer detail that could help solve crime both here and around the world.

"This is just a \$100-million light bulb. Brightness is really the key," said Michael Martin, a researcher at the Advanced Light Source in Berkeley, Calif., at a gathering of scientists in Saskatoon on Friday.

Martin jokingly said he turned to the "experts" in forensics — the CSI sleuths who use cutting-edge technology to help solve their weekly crimes — to show how a synchrotron could enhance criminal investigations.

One of the tools used on the show that can be seen in the CSI laboratory is a Fourier Transform Infrared (FTIR). Add a synchrotron to the infrared spectromicroscope and fingerprints are not just fingerprints anymore. If someone had just touched something that left a residue on the finger and then that person left a fingerprint, the residue can be identified in addition to the fingerprint, said Martin,

as he showed slides proving his point to the scientists. He used gunpowder as an example, saying if gunpowder residue is found on a fingerprint, it could prove who pulled the trigger.

Ink on paper can be analyzed to determine if a document has been forged and whether the same ink and pen were used throughout a document. Because the synchrotron is such a powerful microscope, even the tiniest trace of ink can be analyzed. It can even separate the ink from the paper it's written on, said Martin.

"I'm at the research stage, myself, just laying the groundwork for what is possible, what types of information can you get out of what types of samples," he said in an interview after his presentation.

"We're working our way towards more and more complex systems and eventually to real unknowns and then a real crime scene.

Before scientists at a synchrotron will be engaged by criminal investigators, protocol for handling the materials to be analyzed will have to be established.

"They have to be able to verify that nobody monkeyed with the sample and that's completely critical. The fact that these synchrotrons are large-user facilities — people from all over the world (come to use them) — is great for the science, but is actually the opposite of what you're looking for in terms of securing your sample. There's a little bit of a cultural mismatch."

Applying synchrotron technology to forensics was one of several topics discussed at the Canadian Light Source annual users' meeting in Saskatoon. About 250 people, including scientists from the United States and Europe, attended the educational sessions at the University of Saskatchewan.

Forensics was chosen as a drawing card, says workshop organizer and CLS scientist Tom Kotzer.

"It's like dinosaurs. People just love these types of things," he said in an interview. "We have CSI and Cold Case on TV and everybody is interested in forensics."

The Saskatoon synchrotron hasn't been used to solve any crimes, but the RCMP and Saskatoon police have asked about the possibilities, says Kotzer.

"They're very interested in the advanced analytical capabilities that a synchrotron can bring to crime scenes simply because it's not destructive. You give us a piece of something to look at; we'll look at it, we'll give it back to you, which is very important in a crime scene investigation," he said.

It's only a matter of time before synchrotron technology will be proven as a valuable forensic tool and real criminal investigators will turn to the scientists who use the sophisticated equipment for help with their own crime scene investigations, he added.

lhaight@sp.canwest.com

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